

TRIBAL REVISIONS IN THE ASTERACEAE. XI.

A NEW TRIBE, EREMOTHAMNEAE.

H. Robinson and R. D. Brettell  
Smithsonian Institution, Washington, D.C. 20560.

Continuing studies on tribal delimitations in the Compositae has shown that the monotypic genus Eremothamnus Hoffmann of Southwest Africa is far more distinctive and has a far more significant position in the family than previously recognized. The observed features of Eremothamnus cause recognition here of the genus as a distinct tribe.

Eremothamnus was first described by Hoffman in 1889 and placed in the Senecioneae subtribe Liabinae. Hoffmann stated, "Genus inter Liabinas involucro insigni, habitu fere Dicomae, a qua antheris et stylo longe distat." The position of the genus was maintained by Hoffmann (1894) in his treatment for Engler and Prantl where Newtonia Hoffmann was included in the subtribe and Gongrothamnus Steetz was relegated to synonymy under Vernonia. This concept has long been in need of extensive revision. Recently, Liabum has been removed to a separate tribe Liabeae (Robinson & Brettell, 1973). The fates of Newtonia and Eremothamnus have been summarized by Merxmüller (1954). Newtonia proved to be a later homonym but Hoffmann persisted and provided a new name, Antunesia, even though the genus is actually not distinct from Gongrothamnus. Both Merxmüller and Cronquist (1955) seem to agree with Hoffmann placing the latter in the Vernonieae but seem to favor restoring full generic status. Eremothamnus marlothianus itself has been transferred to Pteronia L. of the Astereae by Dinter and even given a new name P. aizoides by Muschler. Later, Moore (1929) related Eremothamnus to Ondetia Benth of the Inuleae. Merxmüller (1954) himself suggested that Eremothamnus be returned to the Senecioneae where it might be an intermediate with the Inuleae and with such genera as Ondetia. Though not stated, Merxmüller was undoubtedly thinking in terms of the subtribe Liabinae of the Senecioneae.

The present study treats Eremothamnus in the light of a recently acquired bias toward a basic division of the Compositae into two groups (Robinson & Brettell, 1973a). The style of Eremothamnus has the stigmatic surface in a single united adaxial line as in the Vernonieae - Liabeae - Cynareae - Cichorieae series. This ignores for the present the unified stigmatic area found among certain Heliantheae especially in the subtribes Fitchiinae, Lagascinae and Verbesininae. Eremothamnus has other features of the Vernonieae series including the general form of the style, the broad flat anther appendages, the long-projecting

anther bases and the long corolla lobes with smooth inner surfaces. One or more of these basic features preclude any close relationship to either the Astereae or Inuleae with which Eremothamnus has been compared. From the tribes of the remaining related series, Eremothamnus can be separated by a number of technical features without considering some of the unique aspects of the genus. The simple spinose pollen and the ray flowers are unlike the Vernoniaeae; the alternate leaves are unlike the Liabeae; the form and placement of hairs and papillae on the style is unlike the Arctotideae or Cynareae; the soft anther appendages are unlike the Mutisieae; and the disk flowers are unlike the Cichorieae. Not only can Eremothamnus be easily excluded from all the existing tribes but there would be difficulty in determining one to which it would be most closely related.

Eremothamneae, tribus nova Asteracearum. Plantae frutescentes erectae multo ramosae. Folia alterna pauce spinosa. Capitula subsessilia; squamae involucri multiseriatae ad apices papyraceae et plerumque spinosae; receptacula epaleacea; corollae flavae; radii sine antheris minute tridentati; corollae discoid-eorum 5-lobatae, lobis linearibus extus glanduliferis et pauce setiferis; thecae antherarum inferne valde productae et breviter caudatae, cellulis exothecialibus oblongis unusquisque in parte inferioribus valde annulate ornatis, appendicibus mollibus latis elongatis; styli in nectariis parum immersi, ramis elongatis acutis abaxialiter dense setiferis, cellulis setarum bi-tri-seriatis, linis stigmaticis singularibus; achaenia prismatica dense setifera; pappus multisetosus bi-tri-seriatus. Grana pollinis sphaerica ca. 50  $\mu$  diam. valde regulariter spinosa.

The tribe contains the single monotypic genus, Eremothamnus Hoffmann.

The most interesting unique feature of Eremothamnus is the papillosity of the style branch. Cases have been seen in the Heliantheae and Eupatorieae where the hairs of the style are multicellular by one or two transverse septations. Thus far Eremothamnus appears unique in having the hairs with cells bi- or tri-seriate, each cell usually having a separate point. These hairs are more like the setae of the achenes in their cellular arrangement.

Somewhat less distinctive is the anther appendage. As shown in Hoffmann's (1889) illustration the appendage seems much narrower than the thecae and seems like forms in the true Senecioneae and its related tribes, the Astereae and Anthemideae. Such a narrowed appearance seems due to shrinkage of the unusually soft tissue. Once moistened and spread out the appendage is quite long and at the base is as wide as the thecal part of the anther. The only other appendages that seem rather soft are those of the Cichorieae.

The exothecial cells of Eremothamnus are unique in the regular pattern of transverse annular thickenings on the lower half of their walls. The upper half of each cell is without thickenings. The pattern is very regular on the outermost part of the thecae. The only exothecial cells that seem remotely similar are in a number of genera of Cichorieae such as Calyco-seris, Pinaropappus and Hypochaeris which have a few irregular bands restricted mostly to the lower ends of the cells. This form in the Cichorieae is not sufficiently similar to prove any relationship.

The closest relationship of Eremothamnus remains in question. The two most closely associated groups in the literature are the Vernoniae as represented by Gongrothamnus and the Liabeae.

The Vernoniae can be distinguished for the most part by their lack of yellow flowers, but yellow flowers are present in Gongrothamnus. More significant is the lack of ray flowers paralleling the occurrence of at least somewhat modified pollen. Also, the exothecial cells of the Vernoniae are of a consistent quadrate and weakly banded type very unlike those of Eremothamnus.

Other than the unique features of the style and anther appendages, Eremothamnus differs from the Liabeae primarily by the alternate leaves. The Liabeae also have some variation in exothecial cells although none like those of Eremothamnus. The extent of such differences in themselves are not conclusive although phyllotaxy cannot be taken lightly in this group of tribes. A much more important consideration would be, what does a desert plant from Southwest Africa have to do with a primarily rain forest group from Central and South America. The characters they share are all generalized characters of the group of tribes. It is very unlikely that either tribe evolved from the other and there is no reason to place them particularly close.

If the presence of spiny leaves is any indication, relationship of Eremothamnus seems much more likely with the tribes which are also primarily or exclusively Old World. Of these, however, the Arctotideae and Cynareae have styles with vestiture specialized in an entirely different way. The papillae of these styles are unicellular, very sharply pointed, and they usually cover the upper part of the shaft of the style in addition to the backs of the style branches. Also, the Arctotideae almost always have stomates along the margins of the corolla lobes. Such stomates are not found in Eremothamnus. The Cynareae have exothecial cells and anther appendages more like the Mutisieae and very unlike Eremothamnus.

There remains the Cichorieae with members having a Vernonia type style branch more like Eremothamnus. Here concepts are far enough advanced to reject any possible inclusion of Eremothamnus in the tribe and the heads of ligulate flowers can be used as a primary distinguishing character.

Eremothamnus is its own specialized group and is the ancestor of no other group, Nevertheless, by its separate origin tracing back to the true ancestral stock it reveals more about the nature of that stock. It helps indicate that the grouping of most of the tribes with single stigmatic surfaces on their styles is reasonable. Most of all, it is far more likely that an ancestor of the Cichorieae or Mutisieae would have had some characters like Eremothamnus than like such genera as Fitchia which has been erroneously associated with them.

## Literature Cited

- Cronquist, A. 1955. Phylogeny and taxonomy of the Compositae. Amer. Midl. Nat. 53: 478-511.
- Hoffmann, O. 1889. Compositae. in A. Engler, Plantae Marlothianae. Ein Beitrag zur Kenntnis der Flora Südafrikas. Engler Bot. Jahrb. 10: 271-282, pl. 9.
- \_\_\_\_\_. 1894. Compositae. in Engler and Prantl, Die Natürlichen Pflanzenfamilien 4(5): 87-391.
- Merxmüller, H. 1954. Compositen-Studien IV: Die Compositen-Gattungen Südwestafrikas. Mitt. Bot. München 1 (9-10): 357-443.
- Moore, S. 1929. Alabastra diversa - Part XXXVI. 2. Notes on African Compositae. 67: 273-276.
- Robinson, H. and R. D. Brettell 1973. Tribal revisions in the Asteraceae. III. A new tribe, Liabeae. Phytologia 25: 404-407.
- \_\_\_\_\_, and \_\_\_\_\_. 1973a. Tribal revisions in the Asteraceae. VIII. A new tribe, Ursinieae. Phytologia 26: 76-85.